



Saubermacher

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for an environment
worth living in

Recycling and Remanufacturing of Traction Batteries

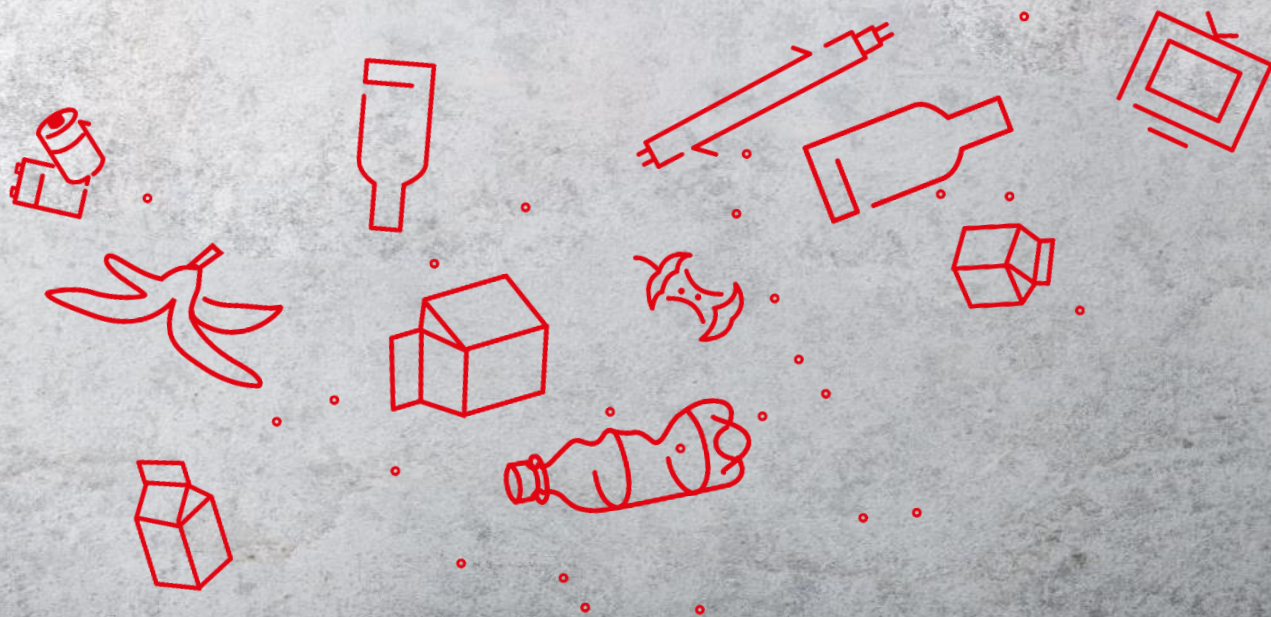
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Saubermacher Dienstleistungs AG



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Our vision of recycling – zero waste

The goal is to leave no waste behind and to make all material recycable.



Key figures

1979

founding year

€ 425

million turnover p.a.*

3,600

employees

77

recycling plants

3,5

million tons of waste p.a.

73

participations

Saubermacher

* 31/12/2022



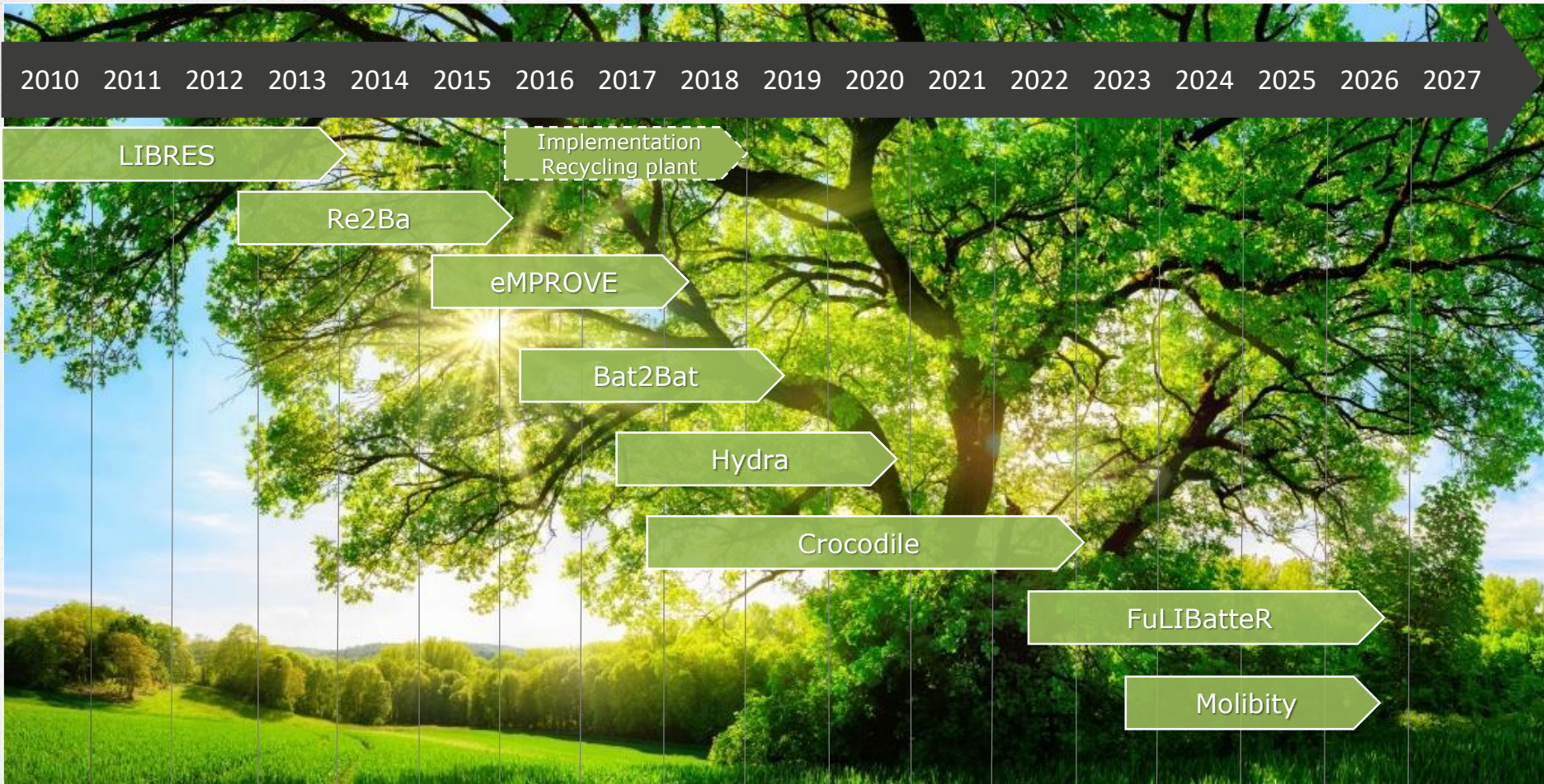
680


specialised vehicles


42,000


customers

History of LIB projects



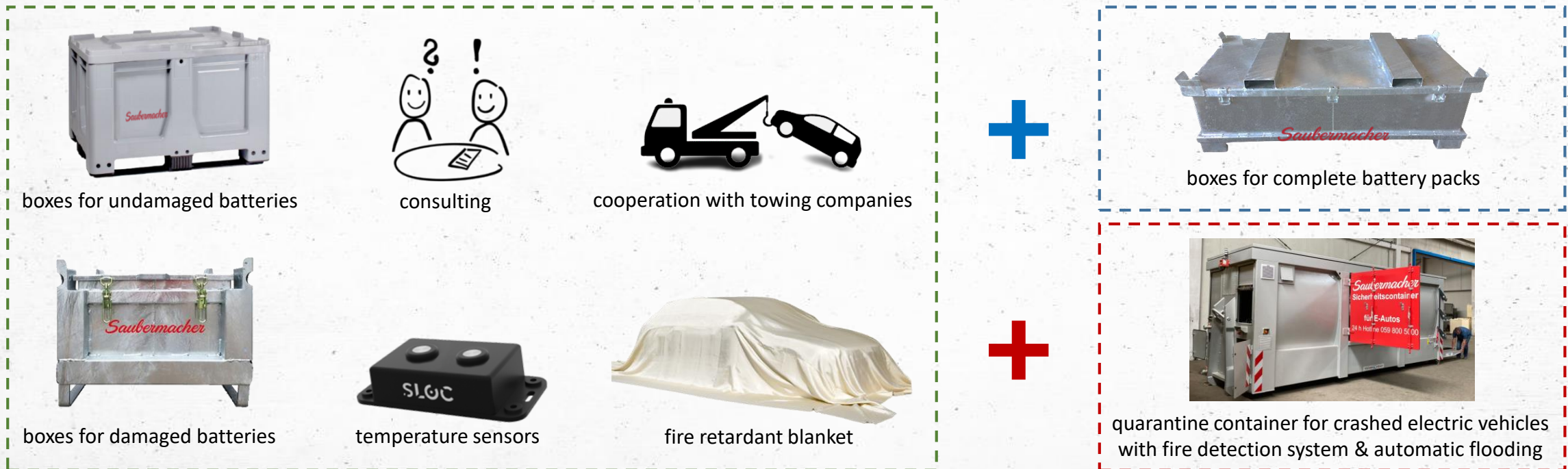
 2016: Acquisition of the company REDUX, a leading company in the recycling of alkaline and NiMH batteries

 2018: start operation of LIB recycling plant, installed capacity: 10.000t

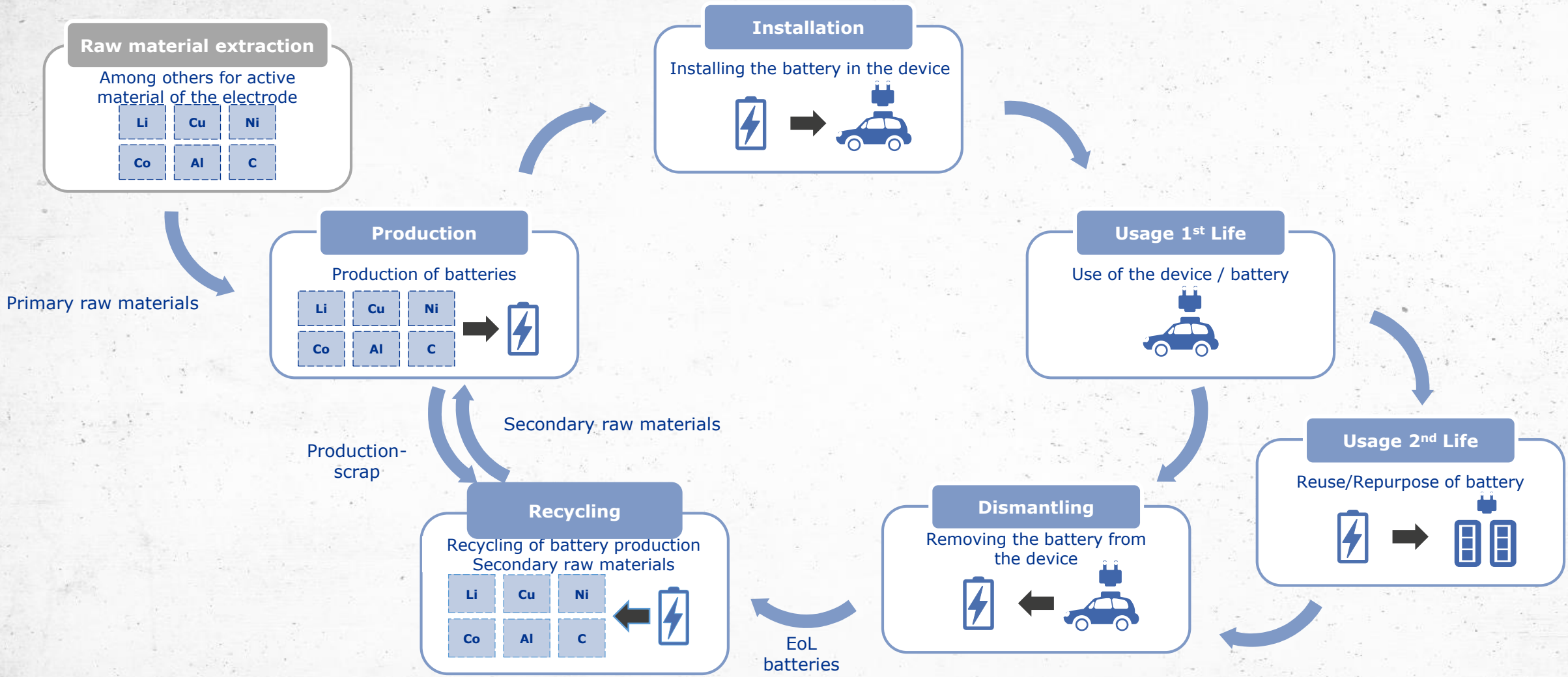
 2023: Redwood acquired 100 percent of the Saubermacher subsidiary Redux (only LIB)

Saubermacher's field of activity

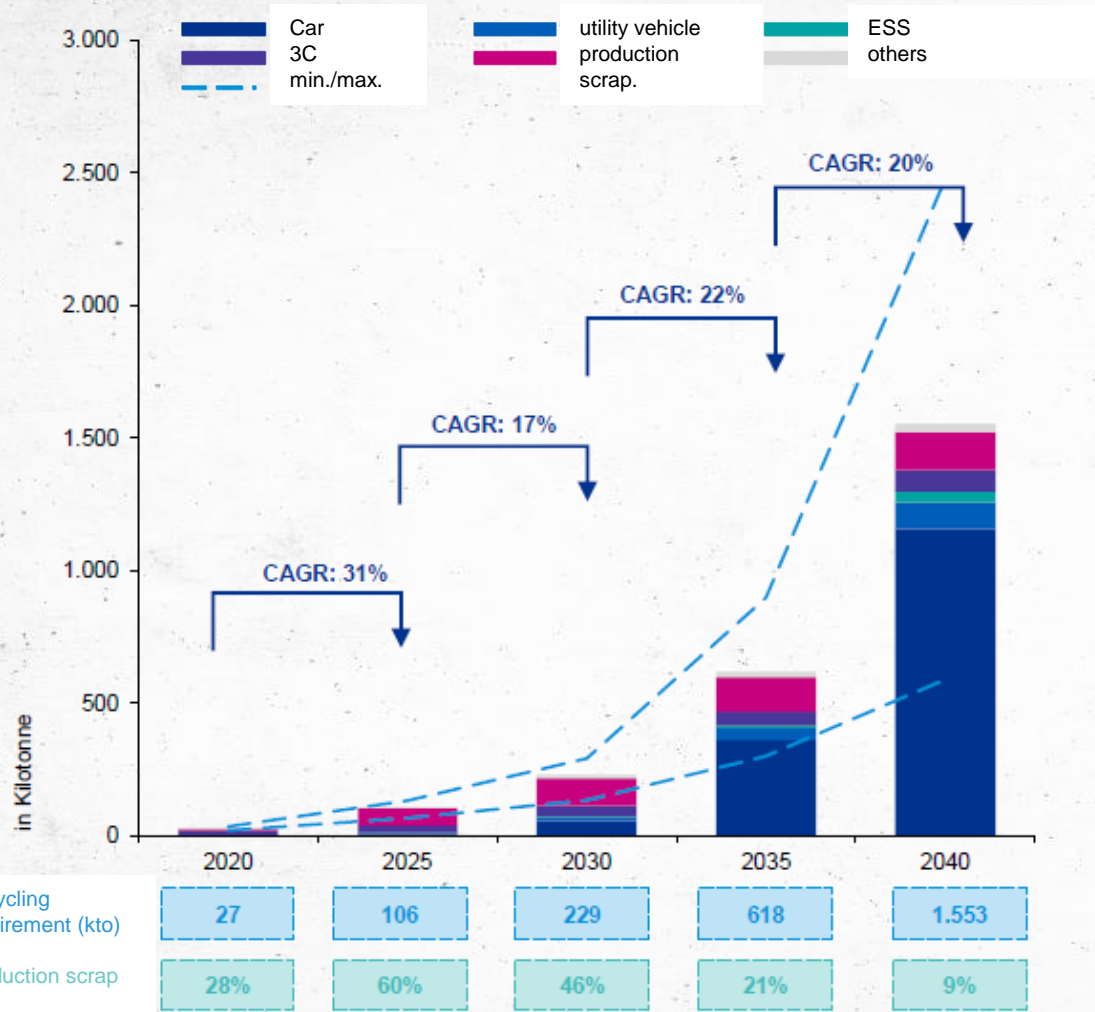
- Collection of any kind of batteries
- Sorting, discharging and dismantling for further recycling processes
- Products and services for car garages



Circular system of LIB



Predicted return flow of batteries



Source: Fraunhofer Institut für System und Innovationsforschung ISI



Production scrap

In the medium term, production waste will make up a large part of the LIB return volumes; this will occur in particular during the start-up phase of the new production facilities.



End-of-Life Batteries

In the long term, EoL will represent the majority of returns; EV batteries are expected to have an average life of 13 to 15 years.



Efficiency gains

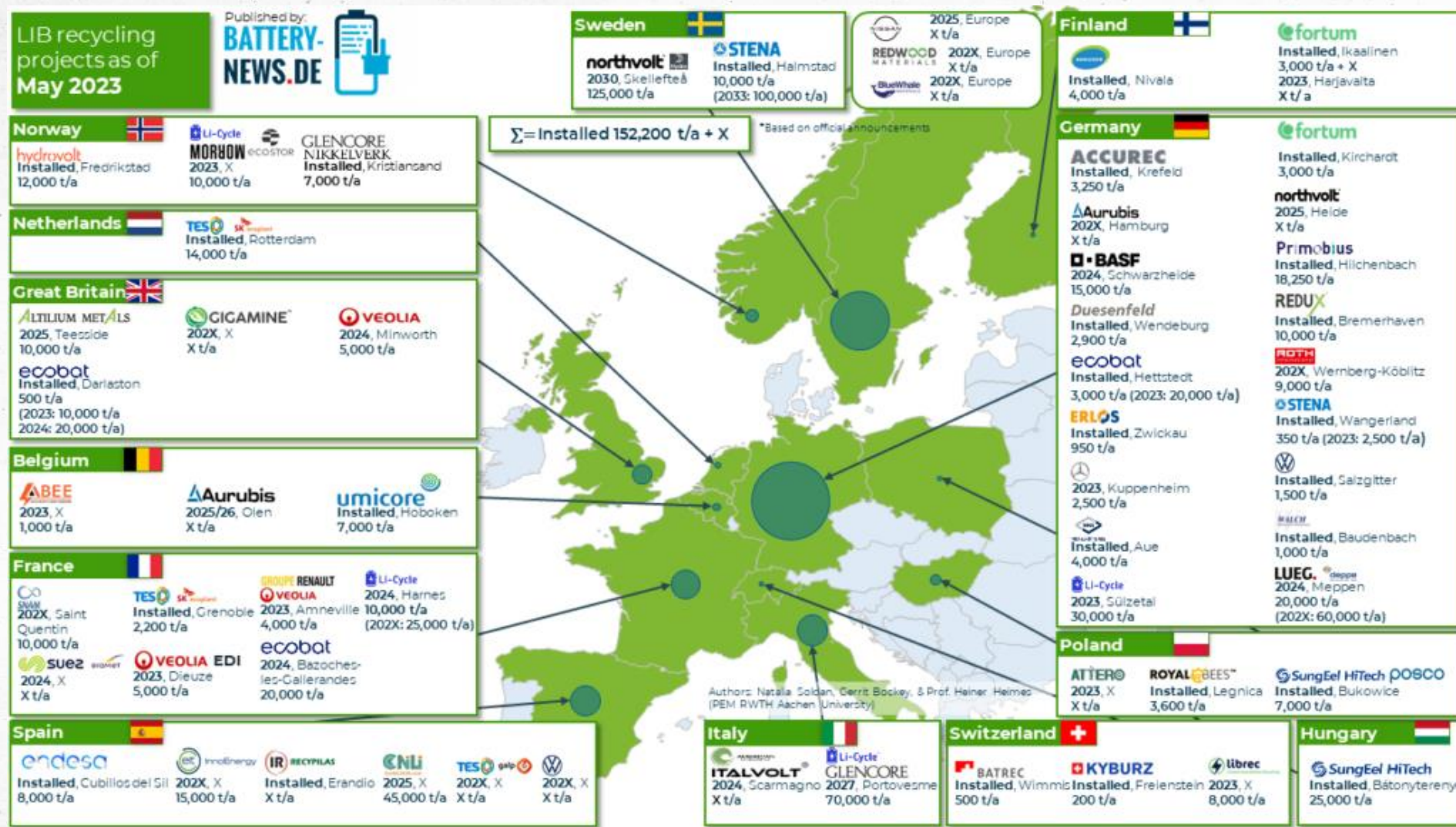
Efficiency increases are expected in the future for both the production and recycling of LIBs, among other things through improved process technologies and automation.



2nd Life

The use of EV batteries in a secondary application is expected by experts for 10-20% of the vehicles and an additional service life of 6 years.

Battery recycling in Europe



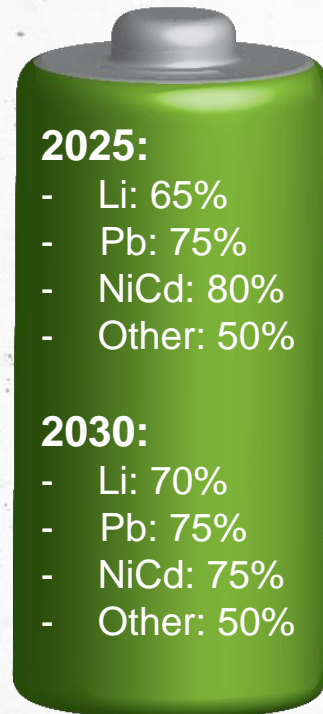
Source: www.battery-atlas.eu, cited October 20, 2023

Battery regulation

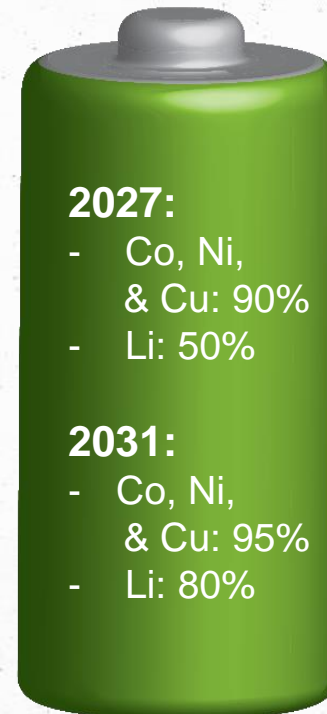


Regulation (EU) 2023/1542:

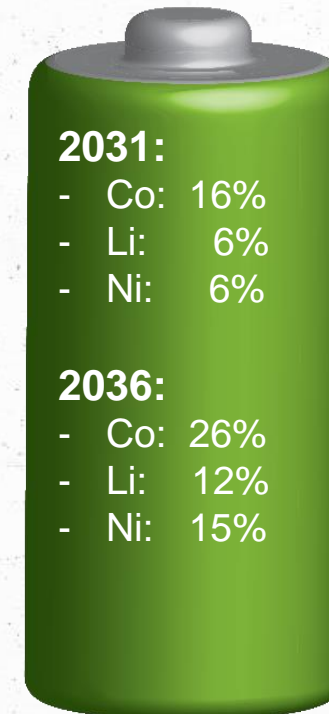
Recycling efficiency



Recovery rate

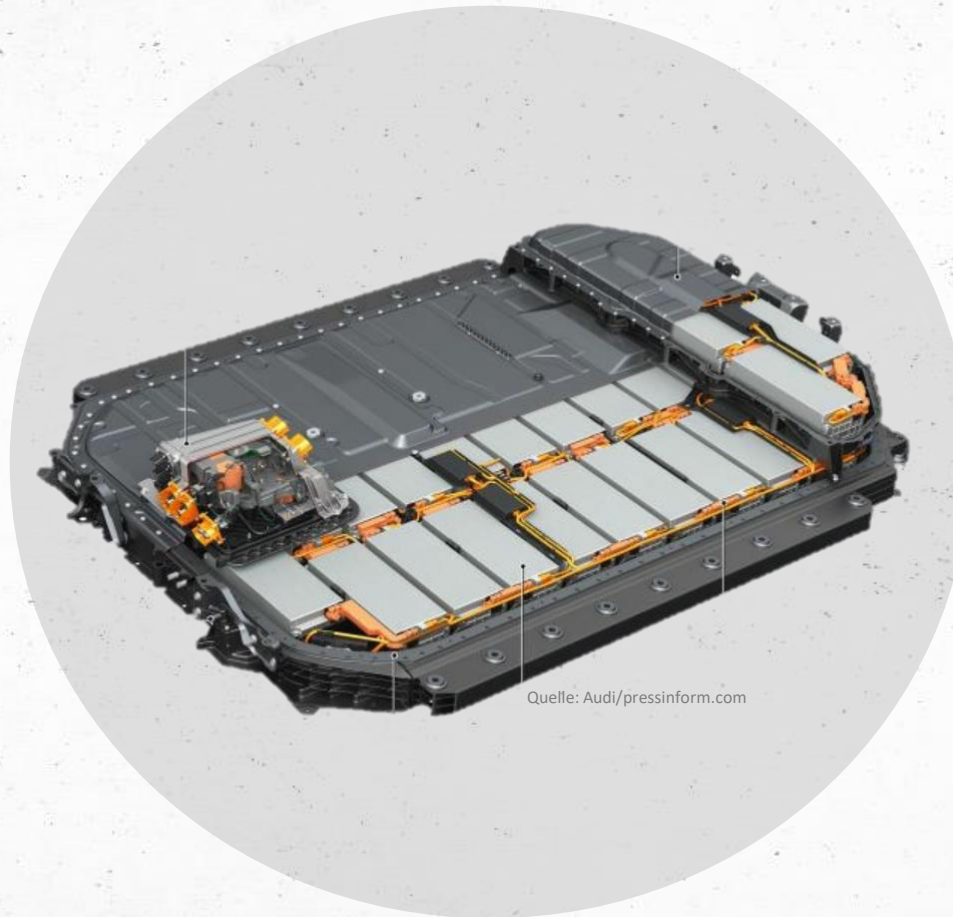


Recycled content



Mass balance on pack level

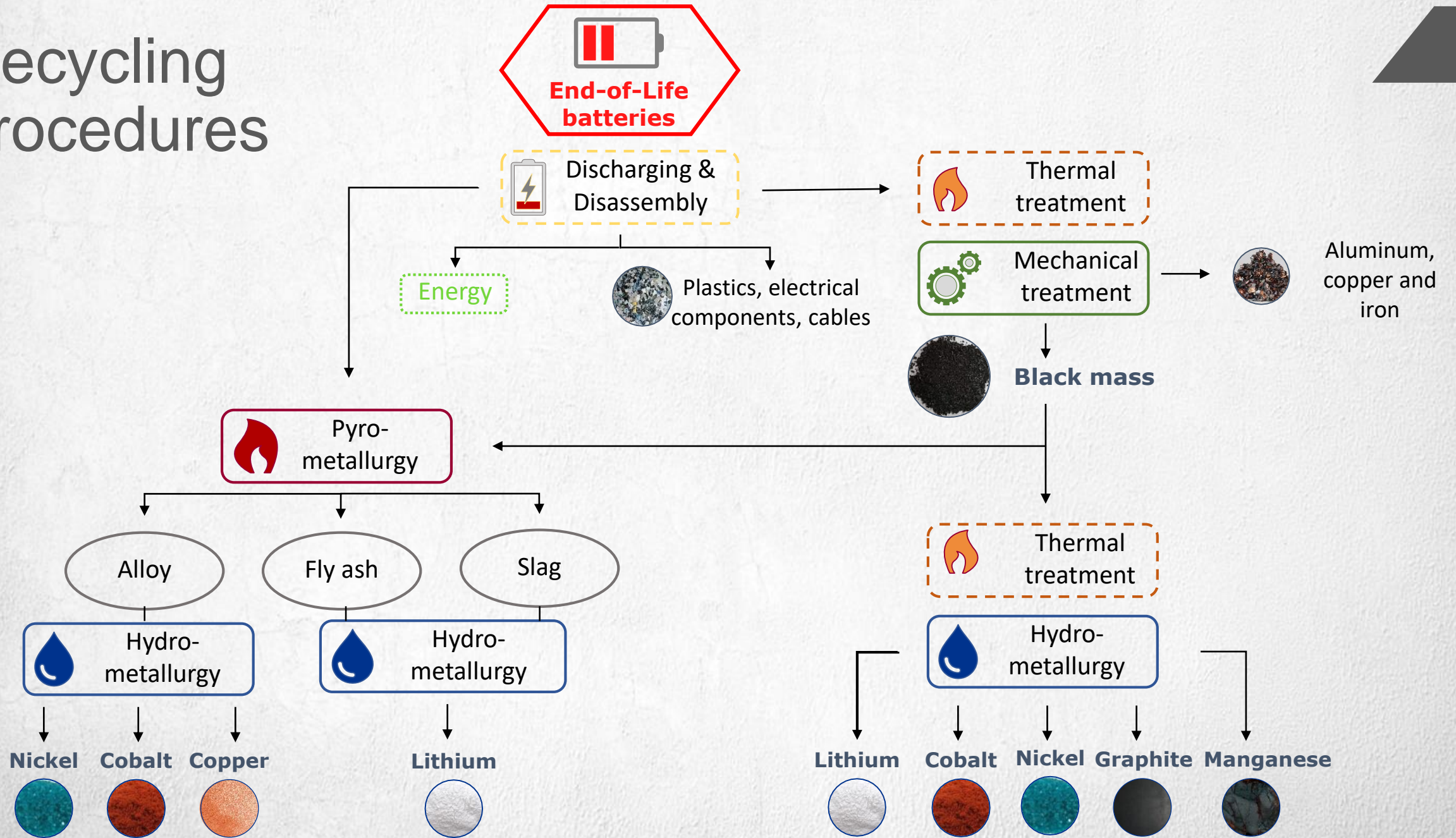
Module	69%
Casing	23%
Elektronics	3%
Cooling system	4%
Cable	1%



Steel	1,1%
Aluminium	34,2%
Copper	6,2%
Nickel	7,6%
Cobalt	2,5%
Manganese	2,3%
Lithium	1,6 %
Others	<0,1%

Carbon	33,9%
Hydrogen	3,6%
Oxygen	6,9%

Recycling procedures



SecondLife Storage

- 10 feet container
- 64 SL battery modules from electric vehicles
- 100 kW power for peak load coverage
- Total capacity 96 kWh
- Use: peak load capping at the company site
- Commissioning 2020



Thank you!

Saubermacher

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